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## (54) A headset accessory for a mobile telephone set

(57) The headphone comprises an exchangeable earpiece portion 5 with a shaped area 23 designed to be grasped between thumb and fore-finger by the user. A noise-cancelling microphone is mounted on a boom extending from the earpiece. In use the headphone is supported by the user's ear.

A base unit 3 for the headphone is attached to a cradle for the mobile telephone. The base unit includes switching means responsive to the presence of the headphone on the base unit to allow use of the telephone in either a loudspeaking mode or a headphone mode.

Signals may be passed between the headphone and the base unit either by way of a cable 7 or by way of a wireless link.

Fig 1

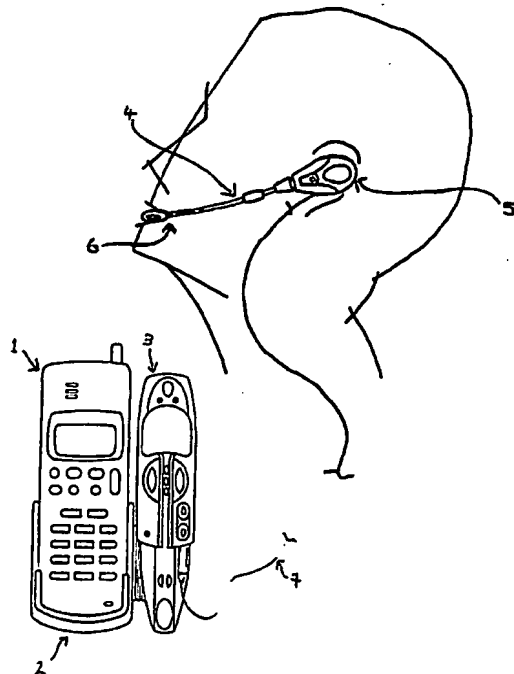
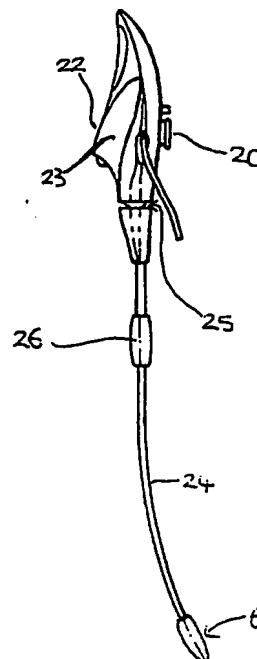


Fig 6

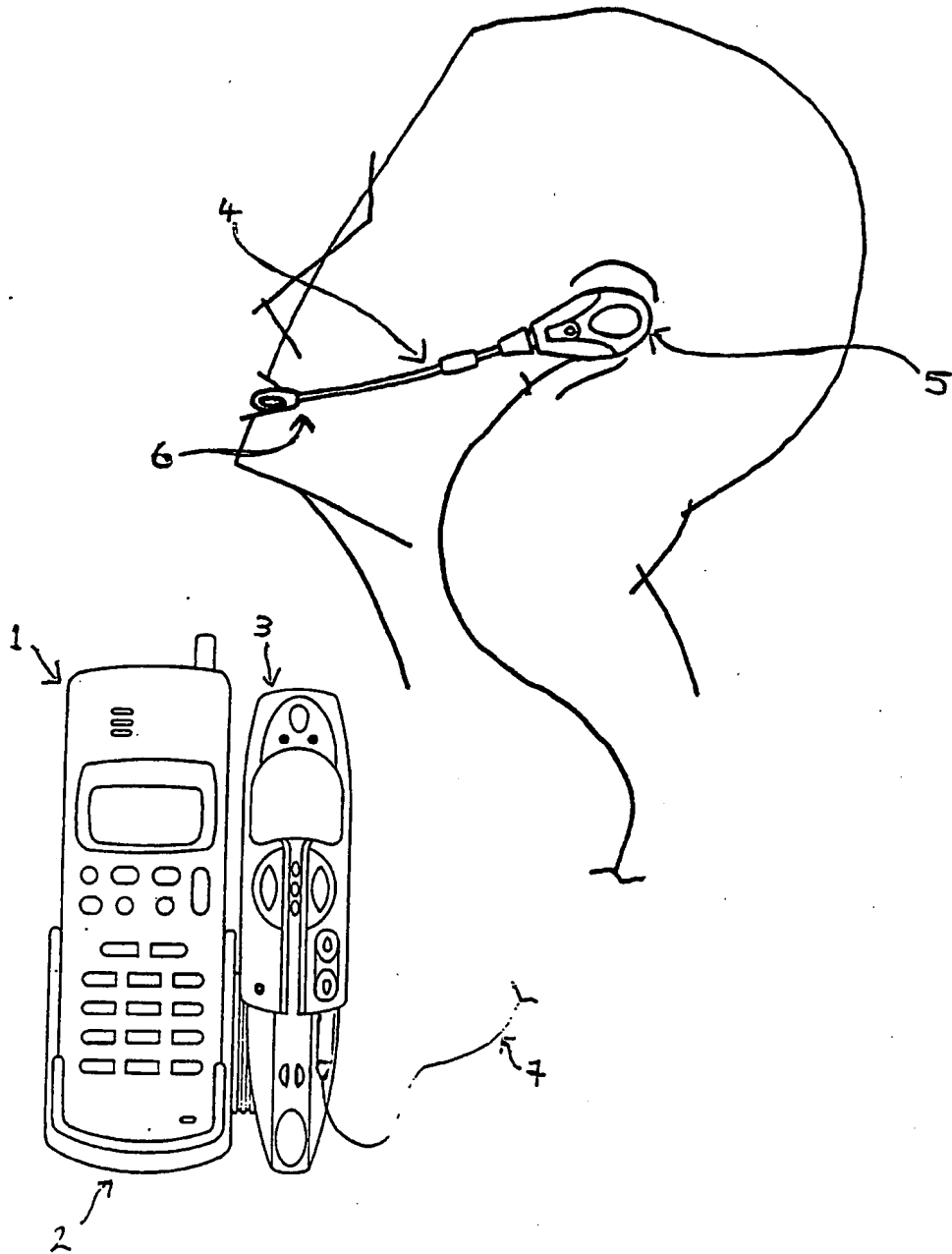


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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FIG. 1

1/3



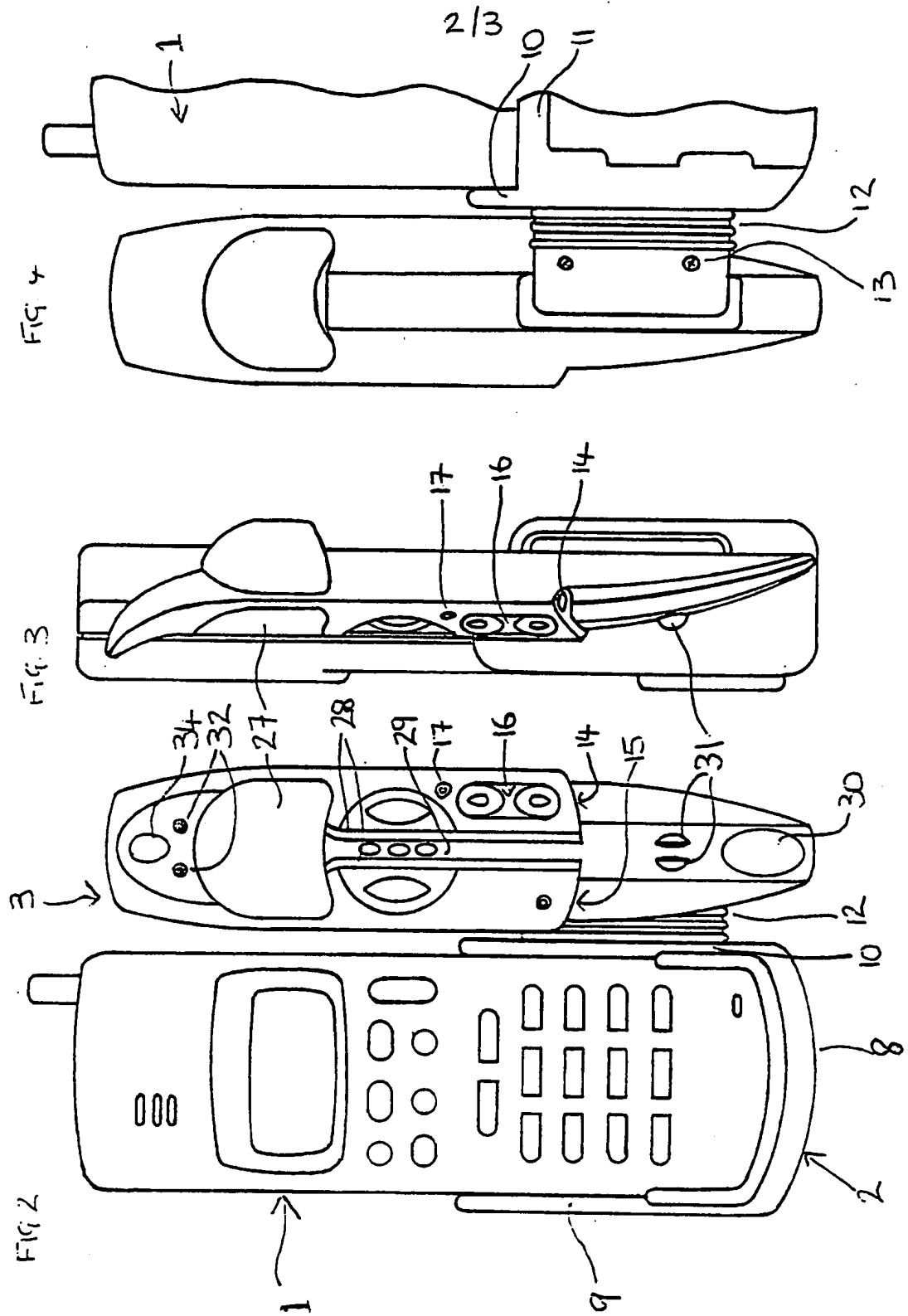
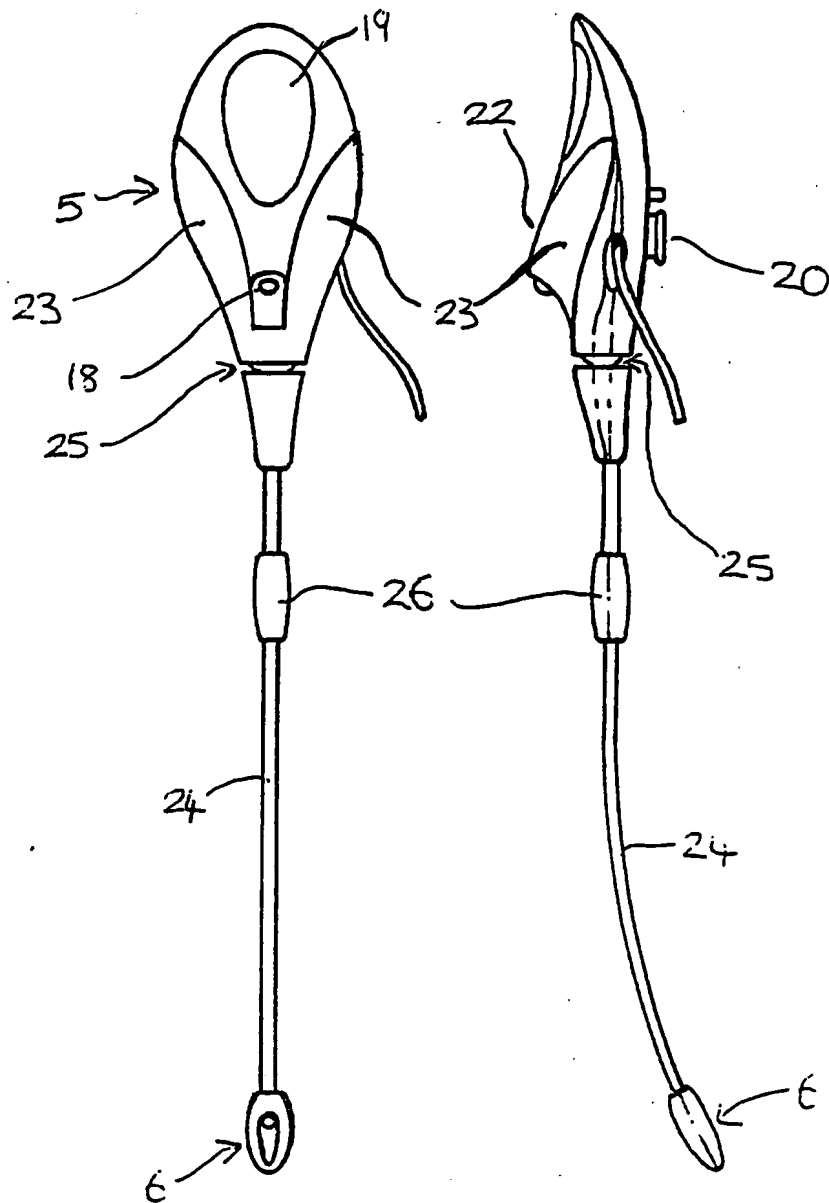


FIG. 5

FIG. 6



## PATENTS ACT 1977

## DESCRIPTION OF INVENTION

## A Telephone Accessory

THE PRESENT INVENTION relates to a telephone accessory and more particularly to an accessory for use with a portable telephone. It is envisaged that the invention may be used with a mobile telephone in a motor vehicle, but the invention is not limited to such use.

The number of mobile telephones which are used in motor vehicles has increased significantly in recent years. There are, however, certain drawbacks associated with the use of a mobile telephone in a motor vehicle such as a car. If a driver wishes to make or receive a telephone call within a car whilst on the move then he must either hold the telephone in one hand whilst driving the car with the other hand (something which is illegal in certain countries) or he must have a special kit fitted in the car to enable the telephone to be used in a "hands-free" mode. These kits are relatively expensive and are designed to be hard-wired into the vehicle in such a way that they cannot readily be transferred from one vehicle to another.

Clearly this is an inconvenience to drivers having more than one vehicle who wish to use a mobile telephone in the vehicle or who wish to change their vehicle. Driving a car using only one hand whilst holding a telephone in the other hand is not only illegal in some countries but is, of course, extremely dangerous.

The present invention seeks to provide a telephone accessory which addresses the problems outlined above.

One aspect of this invention provides an accessory for use with a mobile telephone, the accessory comprising a headset adapted to be worn on the head of a user, the headset incorporating a microphone and a speaker connected to means for transmitting audio signals and receiving audio signals from the mobile telephone.

The accessory may further comprise a base unit adapted to be connected to the mobile telephone, the means for transmitting and receiving audio signals comprising transmitter/receiver means in the headset and the base unit.

Preferably, the base unit includes a microphone and a speaker, switching means being provided to enable a user of the accessory to select whether audio signals are output and input via the speaker and microphone on the base unit or the headset.

Conveniently the base unit defines a seat or rest position for the headset, said switching means being actuated when the headset is received on the base unit so that audio signals are automatically routed via the microphone and speaker in the base unit.

Advantageously, the headset incorporates an earpiece designed to fit snugly within the ear of a user, the user's ear serving as the sole support for the headset.

Preferably the earpiece is designed to be snap-fitted onto the main body of the headset, thereby enabling various sizes and designs of earpiece to be used with the headset.

Conveniently, the headset has a main body which defines a projection designed to be grasped between the thumb and fore-finger of one hand and to facilitate the insertion of the earpiece on the headset into the user's ear using only one hand.

Advantageously, the microphone in the headset is connected to a main body of the headset by way of a support boom, the boom being of arcuate configuration so as to approximately follow the contours of the user's face with the microphone being located adjacent the user's mouth when the earpiece is located in the user's ear.

Preferably, the microphone in the headset is connected to the main body of the headset by way of a ball type joint providing omni-directional adjustment of the microphone relative to the main body.

Conveniently, the microphone boom passes through the ball-joint, the overall length of the microphone boom being adjustable by sliding the boom into and out of the ball-type joint.

Advantageously, the accessory further comprises a cradle designed to receive and form electrical connections with the mobile telephone, the cradle being releasably connectable to the base unit so that signals are transferred between the mobile telephone and the base unit.

Another aspect of this invention provides an accessory for use with a mobile telephone, the accessory comprising a headset adapted to be worn on the head of a user, the headset incorporating a microphone and a speaker connected to means for transmitting audio signals to and receiving audio signals from the mobile telephone, the

headset incorporating an earpiece which fits directly into the ear of a user, the user's ear serving as the sole support for the headset which is thereby supported on one side of the user's head.

The accessory may further comprise a base unit adapted to be connected to the mobile telephone, the means for transmitting and receiving audio signals comprising wireless transmitter/receiver means in the headset and the base unit.

A further aspect of the invention provides an accessory for use with a mobile telephone, the accessory comprising a headset adapted to be worn on the head, the headset incorporating a microphone and a speaker connected to means for transmitting audio signals to and receiving audio signals from the mobile telephone, the headset having a main body defining a projection which may be manually grasped between the thumb and fore-finger of one hand to enable the headset to be positioned upon a user's head using only a single hand.

The invention also provides an accessory as described above in combination with a mobile telephone.

In order that the present invention may be more readily understood and so that further features thereof may be appreciated, the invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic view showing an accessory in accordance with the present invention when in use;



Figure 2 is a front view of part of the accessory with a mobile telephone shown located in the accessory;

Figure 3 is a side view corresponding to Figure 2;

Figure 4 is a partly cut-away rear view corresponding to Figures 2 and 3;

Figure 5 is a front view of a further component of the accessory; and

Figure 6 is a side view of the component shown in Figure 5.

The accessory of the present invention is designed for use with a mobile telephone, such as is identified by the reference numeral 1 in the drawings. The accessory is particularly suitable for use in a motor car to enable the safe use of such a telephone in a "hands-free" mode whilst driving. It is to be appreciated that the accessory may also be used other than in a vehicle.

The accessory comprises a cradle or holder 2 for the mobile telephone which is connected to a base station 3 which accommodates the control electronics for the accessory. The accessory also comprises an "earset" 4 (a headset which is supported in position by the user's ear) which has an earpiece 5 and a microphone 6. The earset 4 is connected to the base station 3 and this may be accomplished either by way of a hard wire connection 7 as is shown in Figure 1 of the drawings or, alternatively, there may be a radio connection between these two components with each of the components incorporating a transmitter and a receiver.

The base station 3 is electrically connected to the mobile telephone 1 by way of terminals located in the cradle 2 which establish contact with the input and output terminals on the telephone when the telephone is located within the cradle. With the telephone received in the cradle 2 the earset 4 may be used to allow the driver of a vehicle to make or receive a telephone call in a hands-free mode.

Looking at the various components of the accessory in more detail, the cradle 2 comprises a plastics moulding which is designed snugly to receive a mobile telephone 1. Thus, different designs of cradle 2 will be produced for different designs of telephone. The specific design of cradle illustrated in the drawings has a base 8, side walls 9, 10 and a rear wall 11. The cradle effectively defines a pocket into which the lower end of the telephone slides. The front of the cradle is, of course, open in order to permit access to buttons and the like located on the telephone. The rear wall 11 of the cradle is designed so that it may readily be connected to a further plastics moulding which could be mounted in position upon a dashboard or elsewhere within a motor car in which the accessory is to be used. This would permit the quick and simple fitting and removal of the accessory within the car.

One side wall 10 of the cradle carries a lateral projection 12 which is releasably connected to the base station 3 by way of screws or the like 13. The projection 12 also incorporates terminals which mate with corresponding terminals located on the rear of the base station 3 when the cradle and the base station are interconnected. The terminals on the projection 12 are wired to the terminals in the base 8 of the cradle and serve to establish electrical connections between the base

station 3 and the terminals in the base 8 of the cradle, by way of which electrical connections are established with the telephone 1. Alternatively the terminals in the base 8 of the cradle may be connected to the terminals on the projection 12 by means of a flexible circuit board. In any event electrical signals are transferred between the telephone 1 and the base station 3. The base station 3 may be separated from the cradle 2 by simply releasing the screws 13 and "unplugging" it.

The accessory is designed to enable telephone calls to be received or made in a hands-free mode either by using the earset 4, which would be mounted on the user's head by inserting the earpiece 5 into one ear so that the microphone 6 is positioned adjacent the mouth with the earset 4 then communicating with the base station 3, or by leaving the earset in its rest position on the base station 3 and using a microphone and speaker provided in the base station. Thus, it will be appreciated that both the base station 3 and the earset 4 each incorporate a microphone and a speaker for an input and output of audible signals.

When the earset 4 is "hard wired" to the base station 3 the wire connection 7 from the earset is connected to a socket 14 on the base station.

When the accessory is provided as a "wireless" unit both the base station 3 and the earset 4 incorporate a transmitter and a receiver so that radio frequency signals can be exchanged between the two components. In each component the transmitter consists of an appropriate modulator/oscillator circuit and the receiver incorporates a radio frequency amplifier, mixer and decoder circuit. The control electronics within the base station permit duplex communication between the earset 4 and the base

station 3 so that the accessory enables simultaneous two way conversation to take place in the same way as with a conventional telephone.

The base station incorporates a power supply management arrangement which enables the electronics to be powered either via the internal battery within the mobile phone 1 or via the electrical power supply system for the motor vehicle in which the accessory is mounted. In this case the base station 3 may be connected to the vehicle power supply by way of a lead extending from a socket 15 on the base station to the cigarette lighter in the vehicle. The socket 15 is similar to the socket 14 which is more clearly visible in Figure 1 of the drawings. When the accessory is being powered via the vehicle power supply system, the power supply arrangement enables the internal battery within the mobile phone 1 to be recharged from the same power supply.

With the wireless version of the accessory the earset 4 will incorporate a rechargeable lithium type battery which does not need to be charged down in order to provide full power. Also, with this version the earset 4 has a sub-miniature on/off switch and a light emitting diode 18 which indicates when the unit is switched on. The on-off switch enables the unit to be switched between a standby position and an off position.

The base station incorporates a volume control 16 to set the volume of the audible signals output by the speaker in the base station or in the earset 4. A light emitting diode 17 or some other visual indicator may be provided adjacent the volume control 16 in order to indicate the setting of the volume level.

The earset also incorporates a send/end button 19 which is used to initiate a telephone call or to pick-up an incoming call in the same way as the corresponding button on the mobile telephone 1.

Within the earset 4 there is also provided a circuit for muting "white" or random background noise which would otherwise generate an output.

At this stage a description will be provided of the mechanical construction of the earset 4 and the base station 3 and how this effects operation and use of the accessory.

As can best be seen from Figures 5 and 6 of the drawings the earpiece 5 of the earset 4 comprises a housing which carries a connector 20 on one side, the connector 20 being designed to carry an acrylic plastics earpiece which is shaped to the internal contours of the ear. This plastic earpiece may be snap-fitted onto the connector 20 and may be provided in different sizes and left or right hand versions to allow the earset to be used on either side of the user's head. A small "key" or projection adjacent the connector 20 serves to prevent unwanted rotation of the acrylic earpiece. The plastics earpiece will fit snugly within the ear and serve as the sole support for the earset 4 on one side of the user's head. The opposite side of the housing for the earpiece 5 is designed with a central upstanding projection 22 which is flanked on either side by arcuate cut-away portions 23. This part of the housing has been ergonomically designed so that the earset 4 may easily be picked-up by grasping the central projection 22 between the thumb and fore-finger. The earset has also been "balanced" in terms of weight distribution so as to be self-supporting on one ear, and comfortable to wear. The

ergonomic design also makes it very simple to pick-up the unit and insert the earpiece connected to the connector 20 into one ear using only a single hand. It will be noted that the send/end button 19 is conveniently located centrally on that side of the housing which defines the projection 22 at a position between the cut-away portions 23.

The microphone 6 is a noise-cancelling microphone and is carried at the end of a boom 24 which is of slightly arcuate form so that it follows the contours of the face between the ear and the mouth so that the microphone is positioned adjacent the mouth when the earpiece is received within the ear. The end of the microphone boom 24 which is remote from the microphone itself is connected to the earpiece 5 by way of a ball and socket-type connection 25 which permits omni-directional adjustment of the microphone. In addition, the microphone boom itself passes through the ball and socket-type joint 25 so that the overall length of the boom may also be adjusted by pushing the boom up into the joint 25.

At a position relatively close to, but spaced from, the end of the boom 24 which connects with the ball joint 25 the boom carries an enlarged collar 26, the purpose of which will be explained hereinafter.

The housing for the base station 3 is designed so as to define a rest position or seat for the earset 4. Thus, as is best seen from Figures 2 and 3 of the drawings, part of the outer surface of the base station 3 defines a well or recess 27 which would normally receive the acrylic earpiece connected to the connector 20, whilst a pair of substantially parallel, slightly spaced walls 28 define a channel 29 within which the microphone boom 24 may be

received. The lower end of the outer surface of the base station defines a recess or well 30 within which the microphone 6 is received when the earset 4 is positioned on the base station.

At a position between the lower end of the channel 29 and the recess 30 the outer surface of the base station defines a pair of upstanding projections 31 with a space therebetween within which a lower portion of the microphone boom 24 is received. The space defined between the projections 31 is such that the microphone boom 24 is gripped lightly and held in position therebetween, whilst the width of the channel 29 is designed so that the enlarged collar 26 located on the microphone boom will also be gripped in the channel thereby ensuring that the earset 4 is held firmly, but carefully, in position on the base station.

As can be seen in Figure 2 of the drawings a pair of terminals 32 are provided at a position just above the well 27, these terminals connecting with corresponding terminals provided on that side of the earpiece 5 which defines the connector 20 when the earset is mounted on the base station. When the earset is in position on the base station the power supply for the base station will also serve to re-charge the rechargeable battery within the earset via these terminals. In addition a low torque microswitch 34 is located just above the well 27 and the terminals 32 on the base station housing. This switch is activated when the earset 4 is located on the base station and acts to switch on the internal speaker within the base station and effectively cut-out operation of the speaker and microphone in the earset 4 until such time as the earset is removed from the base station.

If for any reason the earset is not present then a switch on the underside of the base station may be used in order to permit use of the accessory via the base station speaker and microphone alone.

When the device is in use the mobile telephone 1 will be received within the cradle 2 and the earset will be located on the base station 3 in its "standby" setting. In order to answer an incoming telephone call the user may press the call answer button on the mobile telephone 1 and leave the earset in its rest position on the base station, using the speaker and microphone provided in the base station. Alternatively the user may pick-up the earset 4 from the base station and insert the earpiece into his ear so that the earset is supported on one side of his head with the microphone 6 adjacent his mouth. Picking up the earset 4 from the base station will (depending upon the particular make of mobile telephone being used) automatically answer the telephone with a three second delay which provides time for the earpiece to be inserted in the ear before conversation commences. As explained above picking-up the earset 4 from the base station automatically switches operation to the speaker and microphone provided on the earset.

It is of particular importance to note that the earset has been ergonomically designed so that picking-up the earset from the base station is effected in a most natural manner by grasping the projection 22 between the thumb and fore-finger. Placing the earpiece directly into one ear is a very simple matter and the design of the earpiece is such that it will snugly fit into the ear and serve to support the earset without any risk of the earset falling off the side of the head. The earpiece therefore provides a secure and comfortable support for the earset



which is entirely supported on one side of the head. There is therefore no need to use two hands to try and locate the earset in position as would be the case if, for example, the earset were provided with a head band or the like which is extended over the top of the user's head. It will be appreciated that the earset may be picked-up and located in position on one side of the user's head using one hand so that the driver of a vehicle may still retain control of his vehicle whilst receiving a telephone call.

In order to make a telephone call the user would again dial the number to be called on the mobile telephone in the usual way and then either press the send button on the telephone whilst leaving the earset 4 on the base station and using the internal speaker and microphone in the base station or would then pick-up the earset 4 and position this on his head, then using the microphone and speaker on the earset.

Whilst the user has the option of using the microphone and speaker in the earset or the microphone and speaker in the base station, it should be appreciated that the best sound quality will be achieved when using the earset 4.

It will be appreciated that designing the cradle 2 and the base station 3 so that they may readily be separated enables the accessory to be provided for use with various designs of mobile phone 1 with the base station 3 and the earset 4, which incorporate the more expensive elements of the accessory, being common to all designs of mobile telephone whilst only different designs of cradle 2 will be required to suit the various designs of mobile phone 1. In addition if the user of the accessory purchases a different type of mobile telephone 1 then it is

merely necessary to acquire a new cradle 2 and not to acquire a further base station 3 or earset 4.

Since no part of the accessory is designed to be wired into the vehicle it may be transferred from one vehicle to another without difficulty.

Once the earset 4 has been positioned in the user's ear the user may conduct a telephone conversation in a totally hands-free manner so that he may continue to drive his vehicle in the usual way using both hands.

The accessory not only improves safety whilst driving and using a mobile phone but also reduces the risk of cancer which recent research alleges can be caused by high frequency radiation when using a mobile phone which would normally be used in close proximity to the users head.

## CLAIMS:

1. An accessory for use with a mobile telephone, the accessory comprising a headset adapted to be worn on the head of a user, the headset incorporating a microphone and a speaker connected to means for transmitting audio signals and receiving audio signals from the mobile telephone.
2. An accessory according to claim 1, wherein the accessory further comprises a base unit adapted to be connected to the mobile telephone, the means for transmitting and receiving audio signals comprising transmitter/receiver means in the headset and the base unit.
3. An accessory according to claim 2, wherein the base unit includes a microphone and a speaker, switching means being provided to enable a user of the accessory to select whether audio signals are output and input via the speaker and microphone on the base unit or the headset.
4. An accessory according to claim 3, wherein the base unit defines a seat or rest position for the headset, said switching means being actuated when the headset is received on the base unit so that audio signals are automatically routed via the microphone and speaker in the base unit.
5. An accessory according to any one of claims 1 to 4 wherein the headset incorporates an earpiece designed to fit snugly within the ear of a user, the user's ear serving as the sole support for the headset.
6. An accessory according to claim 5, wherein the earpiece is designed to be snap-fitted onto the main body

of the headset, thereby enabling various sizes and designs of earpiece to be used with the headset.

7. An accessory according to claim 5 or 6, wherein the headset has a main body which defines a projection designed to be grasped between the thumb and fore-finger of one hand and to facilitate the insertion of the earpiece on the headset into the user's ear using only one hand.

8. An accessory according to any one of claims 1 to 7, wherein the microphone in the headset is connected to a main body of the headset by way of a support boom, the boom being of arcuate configuration so as to approximately follow the contours of the user's face with the microphone being located adjacent the user's mouth when the earpiece is located in the user's ear.

9. An accessory according to claim 8, wherein the microphone in the headset is connected to the main body of the headset by way of a ball type joint providing omnidirectional adjustment of the microphone relative to the main body.

10. An accessory according to claim 9, wherein the microphone boom passes through the ball-joint, the overall length of the microphone boom being adjustable by sliding the boom into and out of the ball-type joint.

11. An accessory according to any one of claims 2 to 10, wherein the accessory further comprises a cradle designed to receive and form electrical connections with the mobile telephone, the cradle being releasably connectable to the base unit so that signals are transferred between the mobile telephone and the base unit.

12. An accessory for use with a mobile telephone, the accessory comprising a headset adapted to be worn on the head of a user, the headset incorporating a microphone and a speaker connected to means for transmitting audio signals to and receiving audio signals from the mobile telephone, the headset incorporating an earpiece which fits directly into the ear of a user, the user's ear serving as the sole support for the headset which is thereby supported on one side of the user's head.

13. An accessory according to claim 12, wherein the accessory further comprises a base unit adapted to be connected to the mobile telephone, the means for transmitting and receiving audio signals comprising wireless transmitter/receiver means in the headset and the base unit.

14. An accessory for use with a mobile telephone, the accessory comprising a headset adapted to be worn on the head, the headset incorporating a microphone and a speaker connected to means for transmitting audio signals to and receiving audio signals from the mobile telephone, the headset having a main body defining a projection which may be manually grasped between the thumb and fore-finger of one hand to enable the headset to be positioned upon a user's head using only a single hand.

15. An accessory substantially as herein described with reference to and as shown in the accompanying drawings.

16. An accessory according to any one of the preceding claims in combination with a mobile telephone.

17. Any novel feature or combination of features disclosed herein.

<b>Patents Act 1977</b> <b>Examiner's report to the Comptroller under Section 17</b> <b>-18-</b> <b>(the Search report)</b>	<b>Application number</b> <b>GB 9305987.1</b>
<b>Relevant Technical Fields</b>  (i) UK Cl (Ed.M)     H4J (JL, JDS, JK) (ii) Int Cl (Ed.5)     H04M 1/02, 1/03, 1/04, 1/05, 1/60, 1/62; B60R 11/02	<b>Search Examiner</b> <b>P J EASTERFIELD</b>
<b>Databases (see below)</b> (i) UK Patent Office collections of GB, EP, WO and US patent specifications.  (ii) ONLINE DATABASES: WPI	<b>Date of completion of Search</b> <b>29 MARCH 1994</b>  <b>Documents considered relevant following a search in respect of Claims :-</b> <b>1-16</b>

**Categories of documents**

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<b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.	<b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.
<b>A:</b> Document indicating technological background and/or state of the art.	<b>&amp;:</b> Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	EP 0464011 A1     (ERICSSON)	1, 5, 12, 14, 16
X	US 5191602 A     (PLANTRONICS)	1, 2, 5, 7, 8, 11, 12, 14, 16
X	WO 90/10361 A1     (ULLMAN)	1, 2, 13, 14, 16
X	JP 050103063 A     (MATSUSHITA)	1, 5, 12, 16
X	JP 050103059 A     (MATSUSHITA)	1, 8, 16
X	JP 040306944 A     (MATSUSHITA)	1, 16
X	JP 040127644 A     (FUJITSU)	1, 2, 8, 13, 16

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